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ECLIPSES OF *JUPITER'S* SATELLITES, P. S. T.

(Off left-hand limb as seen in an inverting telescope.)

I,	D,	Mar. 6,	6^h 19^m A.M.	IV,	R,	April 1,	3^h 31^m A.M.
II,	D,	12,	3 21	II,	D,	6,	12 22
I,	D,	15,	2 42	I,	D,	7,	2 52
IV,	D,	15,	5 9	I,	D,	13,	2 50
II,	D,	19,	5 56	I,	D,	14,	4 46
I,	D,	22,	4 36	III,	R,	20,	12 51
III,	D,	22,	5 26	II,	D,	20,	5 30
I,	D,	31,	12 58	I,	D,	23,	1 8
				III,	D,	27,	2 23
				III,	R,	27,	4 51
				I,	D,	30,	3 2

HUSSEY'S MEASURES OF THE OΣ DOUBLE STARS.[*]

By S. W. Burnham.

One of the most important and interesting contributions of practical astronomical work has just been issued by the great Observatory at Mt. Hamilton, as Volume V of the *Publications of the Lick Observatory*. This quarto volume of 227 pages contains the reobservation and measurement by Professor Hussey of all the double stars of the first edition of the Poulkowa Catalogue of 1843. Each of the pairs has been measured on an average of three nights with either the 12-inch or the 36-inch refractor, the most difficult of these objects, of course, being observed with the large instrument. The measures were made principally from 1897 to 1900, and, for the most part, all the measures of each star were made in the same year. It is well known that in the second edition of 1850 of the Poulkowa Catalogue many of the stars of the first catalogue were rejected,—some because the suspected elongation was not confirmed by subsequent examinations, some because the companion-star was too distant, and some because they had been found to be identical with previously known pairs in the catalogues of W. Struve, Herschel, and others. These rejected numbers amount altogether to 106 stars. The original number of the OΣ stars was 514, but other new pairs were found from time to time, and the total number was finally extended to 547.

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[*] Reprinted from *Popular Astronomy* for December, 1901.

HUSSEY has accounted for all these stars, rejected and otherwise, and arranged them in this general catalogue in numerical order, with a table at the end of the volume giving them in order of Right Ascension with positions for 1900, so that any star can be found by its number or place. He has collected with remarkable thoroughness substantially all the published measures of each pair, and placed them in chronological order, with a reference to the place of publication. One can see at a glance whether or not there is any relative motion, and generally what the change is in the last sixty years, where there is change in the components from proper or orbital motion. The notes accompanying each star are complete, and give all that is worth mentioning concerning the character and history of the pair. They are models of completeness for brevity. When necessary they are illustrated by diagrams showing the relative change in the components.

The pairs rejected as single have all been carefully examined with the great telescope, and in each instance no elongation detected under favorable conditions. Many of these stars had been previously examined by the writer with the same telescope and with Chicago 18½-inch with the same result, but it is always possible that a star of this class may be really double, though so close from the rapid motion of the components that at a given time it is single with the largest aperture. As many of these stars have been watched more or less at intervals in the last thirty years, without showing any signs of duplicity, in first-class refractors, it is safe to say that in all probability the orginal observations which led to their being placed in the Poulkowa Catalogue was a mistake, and the supposed elongation not real.

Of the other class of wide pairs, although not likely to be of any interest as physical double stars, many of them were in need of measurement, as some depended upon perhaps a single observation of MADLER made more than half a century ago. Some of them were placed on the working list of neglected pairs prepared by the writer for observation at the Yerkes Observatory, not knowing at that time that HUSSEY'S plan embraced all these stars. My work in this direction was, of course, discontinued after receiving this volume, as there would be no excuse for duplicating work already so carefully and well done.

In the course of these observations Professor HUSSEY found new components to five of the Poulkowa stars, and two of these, OΣ 351 and OΣ 476, seem to be remarkable objects visually, and likely to be remarkable hereafter as physical systems. The known components of the first pair are only 0″.6 apart, while one of them is composed of two stars, with a distance of only 0″.3. In the other case the OΣ components have a distance of 0″.54, and the smaller of these is a close pair, with a distance of 0″.15. These are the closest triple stars known, and are certain to be interesting physical systems, and perhaps in rapid motion. Discoveries of this kind must necessarily be made with large refractors, and while it is possible that these stars are more readily seen now than heretofore, it is certain that they are beyond the grasp of all, or nearly all, the instruments used for the measurement of these stars in former years.

The Director of Lick Observatory and the authorities of the University of California have earned the thanks of the astronomical world for the prompt publication of this beautiful volume. The printer's work has been so well done that it may be said to represent the highest art in this class of composition. The arrangement of the matter and the selection of the various kinds of type make a volume both convenient and pleasant to use. The plan generally is that adopted in the General Catalogue of the β stars, issued as Volume I of the *Publications of the Yerkes Observatory.*

This volume will practically take the place of all former works relating to this subject-matter, since it contains all that is needed in the earlier catalogues and publications. It should prevent hereafter much waste of time in duplicating measures, and observing pairs for which no measures, for many years, are needed. The stars which are shown to be relatively fixed, or where the change is slow, will need no further attention for at least a quarter of a century. On the other hand, those in rapid orbital motion should be measured by one of the large telescopes at short intervals, some of them every year. For some of these binaries new orbits have been computed, based upon the new and later measures. Among others is an orbit of δ *Equulei*, from which it appears that a period of 5.7 years will satisfy the measures as well or better than the 11.4-year period heretofore supposed to be the true time. Should this shorter period prove to be correct — and the prima facie case made seems to be a strong one — it will be the most rapid binary now known. If this pair is carefully watched and measured several times each year when the apparent motion is most rapid, as it doubtless will be at Mt. Hamilton, it will not require long to determine which of the periods is correct. It is fortunate that micrometrical work, and especially that relating to double stars, is in the hands of two such zealous and expert observers as HUSSEY and AITKEN.

One can imagine the pleasure with which the venerable OTTO STRUVE will examine this work, which brings together for the first time in a perfect and permanent form his great discoveries of more than half a century ago. At this time in his life, when his work with the telescope has been concluded, he cannot fail to appreciate the value of this volume as a permanent monument to his memory.